# Darwin and Beyond



Working Place of Darwin in Downe Village http://www.focus.de/wissen/wissenschaft/wissenschaft-darwin-genoss-ein-suesses-studentenleben\_aid\_383172.html Darwin was nearly exclusively working with observations, he only did a very few experiments, some published posthumous



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\* Difference between Pensioner's &Sigar's Caution theney Vadmilsion Fees

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Quarter to Christmas 1829	Porter	Scull	Shoebl. <sup>r</sup>	Shoem. <sup>r</sup>	Smith	Steward	Tailor	Tuit. <sup>n</sup>	Sums	Ded <sup>s.</sup>	N. Sums	Receipts.	
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# THE ORIGIN OF SPECIES

### BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

BY CHARLES DARWIN, M.A., F.R.S., &c.

ORIGIN SPECIES DARWIN

SIXTH EDITION, WITH ADDITIONS AND CORRECTIONS.

(ELEVENTH THOUSAND.)

### LONDON: JOHN MURRAY, ALBEMARLE STREET.

1872.

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http://darwin-online.org.uk/pdf/1872\_Origin\_F391.pdf

### Historical Sketch.

XV

http://darwin-online.org.uk/pdf/1872\_Origin\_F391.pdf

In 1813, Dr. W. C. Wells read before the Royal Society 'An Account of a White Female, part of whose skin resembles that of a Negro'; but his paper was not published until his famous 'Two Essays upon Dew and Single Vision' appeared in 1818. In this paper he distinctly recognises the principle of natural selection, and this is the first recognition which has been indicated; but he applies it only to the races of man, and to certain characters alone. After

In 1831 Mr. Patrick Matthew published his work on 'Naval Timber and Arboriculture,' in which he gives precisely the same view on the origin of species as that (presently to be alluded to) propounded by Mr. Wallace and myself in the 'Linnean Journal,' and as that enlarged in the present volume. Unfortunately the view was given by Mr. Matthew very briefly in scattered passages in an Appendix to a work on a different subject, so that it remained unnoticed until Mr. Matthew himself drew attention to it in the 'Gardeners' Chronicle,' on April 7th, 1860. The differences of Mr. Matthew's view from mine are not of much importance: he seems I am fully convinced that species are not immutable; but that those belonging to what are called the same genera are lineal descendants of some other and generally extinct species, in the same manner as the acknowledged varieties of any one species are the descendants of that species. Furthermore, I am convinced that Natural Selection has been the most important, but not the exclusive, means of modification.

http://darwin-online.org.uk/pdf/1872\_Origin\_F391.pdf



**Reznick, D.N. & Ricklefs, R.E. (2009) Fig. from Darwins Origin of Species, Chapter 4** Darwin's bridge between microevolution and macroevolution. Nature, 457, 7231, pp 837-842 <u>http://www.botanischergarten.ch/Evolution/Reznik-Darwins-Bridge-2009.pdf</u>



**Asa Gray**, leading American Botanist, believed in Evolution but had strong doubts on natural selection

van Wyhe, J. (2009) Charles Darwin 1809-2009. International Journal of Biochemistry & Cell Biology, 41, 2, pp 251-253

http://www.botanischergarten.ch/E volution/VanWyhe-Charles-

Darwin-2009.pdf

Darwin's friend and correspondent, the Harvard botanist Asa Gray, accepted Darwin's evolution—but could not fully accept natural selection. The idea of a blind accidental process creating the appearance of design was abhorrent to his religious feelings. He asked Darwin if he did not think that God created the needed variations in the right direction for natural selection to pick up and develop? Darwin could not see any reason to admit such a superfluous hypothesis. If natural selection worked as he believed it did, there would be no need for any 'guiding' of the variations—which were simply omnipresent anyway.





	Born	May 28, 1807(1807-05-28) <u>Haut-Vully</u> , <u>Switzerland</u>
	Died	December 14, 1873 (aged 66) <u>Cambridge</u> , <u>Massachusetts</u>
A A A A A A A A A A A A A A A A A A A	Fields	<u>Paleontology</u> , <u>Glaciology</u> , <u>Geology</u> , <u>Natural</u> <u>History</u>
Louis Agassiz, discoverer of the ice age, and great paleontologist, was a "creationist", actually a polygeneticist and racist: I have seen thousands of species dying out, but never ever a species newly created	<u>Alma mater</u>	<u>University of</u> <u>Erlangen-</u> <u>Nuremberg</u>

Agassiz denied that species originated in single pairs, whether at a single location or at many. He argued instead that multiple individuals in each species were created at the same time and then distributed throughout the continents where God meant for them to dwell. His lectures on polygenism were popular among the slaveholders in the South; for many this opinion legitimized the belief in a lower standard of the Negro.<sup>[5]</sup> Interestingly, his stance in this case was considered to be quite radical in its time, because it went against the more orthodox and standard reading of the Bible in his time which implied all human stock descended from a single couple (Adam and Eve), and in his defense Agassiz often used what now sounds like a very "modern" argument about the need for independence between science and religion; though Agassiz, unlike many polygeneticists, maintained his religious beliefs and was not anti-Biblical in general. http://en.wikipedia.org/wiki/Louis Agassiz





The story of the 41 Family-Groups of the Ammonites (Cephalopoda), with a Mass-Extinction towards the end of Devon, end of Perm, in theTrias and again in the Cretaceous. Sometimes, only a single group survived, which spread again in great diversity afterwards. The breadth of the graphs are proportional to the number of genera known from fossil records (after Newell 1967)





soma.npa.uiuc.edu/courses/ physl341/limulus.1.jpg

Mesolimulus walchi aus den Solnhofener Plattenkalken (150 Millionen Jahre). Körperlänge 6 cm. Paläontologische Staatssammlung München.

![](_page_16_Picture_0.jpeg)

.---Chinese and U.S. scientists have identified what is believed to be the world's oldest flowering plant. The 140-million-year-old fossil was found lately in northeastern China. Sun Ge, a researcher with the Academia Sinica in Nanjing, China, and David Dilcher with the University of Florida, worked together earlier this year to identify the specimen, which predates the previous oldest-known flower by 25 million years. Sun's and Dilcher's work is to be published in Friday's issue of the journal Science. (Photo courtesy of David Dilcher) http://www.napa.ufl.edu/98news/flowerph.htm

![](_page_17_Picture_0.jpeg)

HARUN YAHYA: Naïve, amateurish and pseudoscientific statement: There is no difference between this 54- to 37million-year-old fossilized plane tree leaf and leaves of the same species alive today.

![](_page_18_Picture_0.jpeg)

![](_page_18_Picture_1.jpeg)

A tree fern that lived 365-290 million years ago, which is no different from present-day specimens.

This plant, Senftenbergia plumosa, consists of dividing, compound leaves, and dates back to the Carboniferous period (300 million years ago).

**HARUN YAHYA:** Naïve, amateurish comparison of fossil records with living ferns

A statement from the Encyclopedia Britannica, open access page http://www.1911encyclopedia.org/Palaeobotany

It is a striking fact that among the numerous Mesozoic Ferns there **are comparatively few that can with good reason be referred to the Polypodiaceae**, a family which plays so dominant a role at the present day. The frequent occurrence of such names as *Asplenium*, *Adiantum*, *Davallia*, and other Polypodiaceous genera in lists of fossil ferns is **thoroughly misleading** 

![](_page_20_Figure_0.jpeg)

**Reznick, D.N. & Ricklefs, R.E. (2009) Fig. from Darwins Origin of Species, Chapter 4** Darwin's bridge between microevolution and macroevolution. Nature, 457, 7231, pp 837-842 <u>http://www.botanischergarten.ch/Evolution/Reznik-Darwins-Bridge-2009.pdf</u>

![](_page_21_Figure_1.jpeg)

Diversity of leaf shapes tertiary flora of Öhningen Switzerland

warm – temperate deciduous mixed forest

from H.D.Mai 1995

Abb. 155. Florenbild des Florenkomplexes von Öhningen am Bodensee. Warmtemperierter Laubmischwald (Mixed Mesophytic Forest).

![](_page_22_Figure_0.jpeg)

bb. 171. Isoporien-Karte von im europäischen Tertiär nachgewiesenen paläosubtropischen Gattungen in Mittelid Nordamerika. Zahlen vgl. Abb. 174. Ausgewertet wurden: Castanopsis, Eurya, Ternstroemia, Ficus, Symplocos, igelhardia, Myrica, Sarcococca, Meliosma, Illicium, Turpinia, Distylium, Sequoia.

Aus H.D.Mai 1995

![](_page_23_Figure_0.jpeg)

Abb. 75. Anteile der geographischen Florenelemente in den tertiären Floren aus dem Bereich Schlesien, Mittel- und Südpolen. (Nach den Angaben von Szarzz 1961 zusammengestellt.) ▲ subtropisch und tropisch, ④ ostasiatisch, ■ nordamerikanisch, ◆ mediterran i. w. S., () temperiert holarktisch, eurasiatisch und europäisch, □ arktisch, alpin und arktisch-alpin, △ synanthrop. 1 = Oligozān: Osieczow (Lausitzer Becken), 2 = Oberoligozān/Untermiozān: Wiesa-Turów, 3 = Mittelmiozān: Wieliczka, Becken von Gdow, 4 = Torton: Konin, Rypin, Dobrzyń, 5 = Torton: Sośnica (Schlesien), 6 = Obertorton: Alt-Gleiwitz, 7 = Unterpliozān: Krościenko Huba, 8 = Mittelpliozān: Mizerna I und I/II, 9 = Oberpliozān: Mizerna II, 10 = Günz-Kaltzeit: Mizerna II/III, 11 = Tegelen-Warmzeit: Mizerna III, 12 = Mindelkaltzeit: Ludwinów, 13 = Mindel-Riß-Warmzeit: Olszewice, 14 = Riß-Kaltzeit: Krystynopol, Tarzymiechy, 15 = Riß-Würm-Warmzeit: Bedlno, 16 = Würm-Kaltzeit: Loki Dolne, Barycz, 17 = Postglazial: Włoszczowa.

#### Mutmassliche stammesgeschichtliche Zusammenhänge nach Ehrendorfer aus Frohne et al. 1973

![](_page_24_Figure_1.jpeg)

Vermutliche stammesgeschichtliche Zusammenhänge zwischen den Verwandtschaftsgruppen der Samenpflanzen und ihre Entfaltung in den Zeitaltern der Erde (die Zahlen am Beginn der Formationen stehen für Jahrmillionen). Unsichere, durch Fossilfunde nicht dokumentierte Verbindungen gestrichelt bzw. weiß belassen. B = Bennettitidae, P = Pentoxylidae, E = Ephedridae, G = Gnetidae, W = Welwitschiidae. (Orig.)

![](_page_25_Figure_0.jpeg)

**Reznick, D.N. & Ricklefs, R.E. (2009) Fig. from Darwins Origin of Species, Chapter 4** Darwin's bridge between microevolution and macroevolution. Nature, 457, 7231, pp 837-842 <u>http://www.botanischergarten.ch/Evolution/Reznik-Darwins-Bridge-2009.pdf</u>

![](_page_26_Picture_0.jpeg)

![](_page_26_Picture_1.jpeg)

![](_page_26_Picture_2.jpeg)

## Cordaitatae

taggart.glg.msu.edu/ bot335/econif.htm

![](_page_27_Picture_0.jpeg)

![](_page_28_Picture_0.jpeg)

Sigillaria Ein 250 Millionen Jahre alter Wurzelstock aus dem Piesberg im Museum Von Osnabrück

![](_page_29_Figure_0.jpeg)

http://www.nibb.ac .jp/annual\_report/ 2001/html/ann404 .html

![](_page_30_Figure_0.jpeg)

Some of the seed fern groups are colored indigo brown on the dendrogram. Corystosperms and glossopterids appear in blue typescript. Bennettitaleans are denoted by the reddish-brown type-face. Pentoxylales are colored pink on the chart. Gnetophytes, once regarded as a sister group to flowering plants (J. A. Doyle and Donoghue 1986, 1987; Donoghue and J. A. Doyle 2000) are displayed as purple letters. Cycadales and *Caytonia* are shown on the graphic in green letters. Common groups of conifers and the ginkgos appear in brown type. Finally, some of the critical fossil groups of flowering plants and extant angiosperms are depicted in red type.

http://www.gigantopteroid.org/i mages/DoyleSeedPlantPhylog eny2008.gif

A Phylogeny of Seed Plants (After J. A. Doyle 2008)

![](_page_31_Picture_0.jpeg)

![](_page_31_Picture_1.jpeg)

Delnortea and American gigantopterids.

## strictly fossil no relatives survived

http://www.gigantopte roid.org/html/researc h.htm

![](_page_32_Picture_0.jpeg)

The image to the left is a plate showing the morphology of some glossopterids. It is Figure 7 from Peter R. Crane (1985), Phylogenetic analysis of seed plants and the origin of angiosperms, Annals of the Missouri Botanical Garden 72: 716-796, reprinted with permission of the Missouri Botanical Garden and Peter Crane.

http://www.gigantopteroid.org/ht ml/research.htm

Morphology of glossopterids strictly fossil.

![](_page_33_Figure_0.jpeg)

![](_page_33_Picture_1.jpeg)

Glossopteris from the Gondwana - Kontinent

http://www.paleontology.unibonn.de/glossopteris.htm

![](_page_34_Picture_0.jpeg)

Fossils of the seedfern *Glossopteris* (dark green) found in all of the southern continents provide strong evidence that the continents were once joined

http://en.wikipedia.org/wiki/Glossopteris

![](_page_35_Picture_0.jpeg)

The image to the left consists of four drawings showing the fructification morphology of certain vojnovskyaleans. It is Figure 1 from S. V. Naugolnykh (2001), Morphology and systematics of representatives of Vojnovskyales, Paleontological Journal 35(5): 545-556, reprinted with written permission of Pleiades Publishing, Inc. I thank Serge V. Naugolnykh and the Paleontological Journal for this contribution.

Fructification morphology of representatives of Vojnovskyales


The plate reproduced on the left shows reconstructed, detached organs of bennettitaleans. It is Figure 11 from Peter R. Crane (1985), Phylogenetic analysis of seed plants and the origin of angiosperms, Annals of the Missouri Botanical Garden 72: 716-796, reprinted with permission of the Missouri Botanical Garden and Peter Crane.

Morphology of Bennettitales

### Mutmassliche stammesgeschichtliche Zusammenhänge nach Ehrendorfer aus Frohne et al. 1973



Vermutliche stammesgeschichtliche Zusammenhänge zwischen den Verwandtschaftsgruppen der Samenpflanzen und ihre Entfaltung in den Zeitaltern der Erde (die Zahlen am Beginn der Formationen stehen für Jahrmillionen). Unsichere, durch Fossilfunde nicht dokumentierte Verbindungen gestrichelt bzw. weiß belassen. B = Bennettitidae, P = Pentoxylidae, E = Ephedridae, G = Gnetidae, W = Welwitschiidae. (Orig.)



The image to the right and the figure legend below in quotation marks is from page 753 of Peter R. Crane (1985), Phylogenetic analysis of seed plants and the origin of angiosperms, Annals of the Missouri Botanical Garden 72: 716-796, reprinted with permission of the Missouri Botanical Garden and Peter Crane

Morphology of the *Caytonia* plant



The image to the left and figure legend is from page 755 of Peter R. Crane (1985), Phylogenetic analysis of seed plants and the origin of angiosperms, Annals of the Missouri Botanical Garden 72: 716-796, reprinted with permission of the Missouri Botanical Garden and Peter Crane.

Morphology of corystosperms



The image to the right is Figure 19 Peter R. Crane (1985), Phylogenetic analysis of seed plants and the origin of angiosperms, Annals of the Missouri Botanical Garden 72: 716-796, reprinted with permission of the Missouri Botanical Garden and Peter Crane

Morphology of *Pentoxylon* plants

Characters	Archaefructus	Caytonia	Cycadeoidea	Dicroidium	Eoantha	Furcula	Pentoxylon	Sanmiguelia	Schmeissneria
Leaves: simple, pinnate	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Leaves: meshed and areolate	Yes	Yes	No	No	No	?	No	No	No
Leaves: petiolate with abscission layer	Yes	Yes	Yes	Yes	?	Yes	Yes	No	No
Phloem: sieve tube complexes, fibers	?	?	?	Yes	?	?	?	?	?
Xylem: bifacial cambium, vessels	?	?	No	Yes	?	?	?	?	?
Nodal anatomy: multilacunar	?	?	?	Yes	?	?	?	?	?
Flowers or flower-like strobili	Yes	No	Yes	No	Yes	No	No	Yes	No
Ovules: enclosed by carpel wall	Yes	No	No	No	No	?	No	Yes	Yes
Ovules: bitegmic	Yes	Yes	Yes	No	No	?	?	?	?
Archegonia absent in female gametophyte	?	?	?	?	?	?	?	Yes	?
Pollen saccate	No	Yes	No	Yes	?	?	No	No	?
Pollen tectate with columnar wall	?	No	No	No	?	?	?	?	?
Stamens and/or anthers present	?	No	No	No	No	?	No	Yes	?
Monopodial shrub or tree	No	?	Yes	Yes	?	?	Yes	Yes	?

#### Table 3. Mesozoic Seed Plants: Summary of Some Diagnostic Anatomical and Morphological Characters.

Table 3 summarizes the diagnostic anatomical and morphological characters of Mesozoic seed plants, excluding flowering plants. To maintain continuity with the <u>essay on the origin of angiosperms</u>, which has two tables, the following table becomes Table 3. *Caytonia* includes its component morphotype genera (*Caytonia*, *Caytonanthus*, and *Sagenopteris*). In a similar way the *Dicroidium* column incorporates the morphotype genus *Umkomasia*. Finally the column labeled as *Sanmiguelia* includes its morphotype genera (*Axelrodia*, *Sanmiguelia*, and *Synangispadixis*).

The source of information in Table 3 is Cornet (1989), Crane (1985), Klavins *et al.* (2002), Krassilov (1997), Stewart and Rothwell (1993), G. Sun *et al.* (2001), and X. Wang *et al.* (2007). The genera listed in the table header belong to (or are allied with) several of the major groups of seed plants, including *Archaefructus*, *Caytonia* (Caytoniales), *Cycadeoidea* (Bennettitales), *Dicroidium* (Corystospermales), *Eoantha* (Gnetales?), *Furcula* (Peltaspermales), *Pentoxylon* (Pentoxylales), *Sanmiguelia* (anthophyte *incertae cedis*), and *Schmeissneria* (anthophyte *incertae cedis*). <u>http://www.gigantopteroid.org/html/research.htm</u>



## *Ginkgoites hermelinii* (Hartz) Harris

Trias Age, Fossil collected in 1907 at Helsingborg, Skåne Sweden by A. G. Nathorst. Ginkgoites is a related genus of the still living Ginkgo biloba from China.

Ginkgoites has died out by the end of the warming period in cretaceous times.

http://www.nrm.se/sv/meny/forskningo chsamlingar/enheter/paleobotanik/virtu ellautstallningar/bildgalleri.1351.html

Swedish Natural History Museum in Stockholm, from the new database



Fig. 11-14. Ginkgophyte leaves from Scoresby Sound, East Greenland. A, B. Ginkgoites fimbriata; A. leaf, 0.5X; B. stomate, 300X. C, D. Baiera boeggildiana; C. leaf, 1X; D. stomate, 400X. E. Ginkgoites minuta, %X. F, G. Ginkgoites hermelini; F. leaf, 0.5X; G. stomate, 250X. H. Baiera leptophylla, 0.6X. (From Harris, 1935.)

Ginkgophyte leaves from Scoresby Sound East Greenland







Fig. 6 Schematic drawing showing radiation of the different lineages of ginkgoaleans from the archetype Trichopitys

from the website of the International Organization of Palaeobotany <a href="http://www.palaeobotany.org/iop/living-fossils/24/">http://www.palaeobotany.org/iop/living-fossils/24/</a>



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Drimys winteri

Drimys piperita

Drimys winteri, Winteraceae, southern hemisphere wood anatomy archaic, unique for flowering plant, like conifers





The fairy tale of Archaeopterix being simply a bird, no missing link ??

again an example of amateurish bla bla



# *Archaeopteryx* is precisely a transitional form.

## Archaeopteryx has prominent avian features, including

- a wishbone
- feathers

• a bony sternum in one of the latest specimens (Svitil 1994)

But *Archaeopteryx* also has many reptilian characteristics, such as

- a pubic peduncle
- a long, bony tail
- no pygostyle

• three well- developed fingers (with the same number of bones as most dinosaurs)

- three well-developed metacarpal bones
- unfused metacarpal bones
- separate metatarsal bones
- no hypotarsus
- abdominal ribs

(list from McGowan 1984:117) http://www.vuletic.com/hume/cefe c/5-4.html



Figure 2. Threedimensional virtual reconstruction of one fossil feather in phase contrast microtomography: (a–c) long barbs form two vanes on each side of a relatively flattened shaft; (d) the shaft is flattened and composed by the still incompletely fused bases of the barbs, a stage in feather evolution that was hitherto unknown in fossil and recent records. Scale bars, 100 mm.

Perrichot, V., Marion, L.C., Néraudeau, D., Vullo, R., & Tafforeau, P. (2008) The early evolution of feathers: fossil evidence from Cretaceous amber of France. Proceedings of the Royal Society B: Biological Sciences, 275, 1639, pp 1197-1202 http://www.botanischergarten.ch/Evolution/ Perrichot-Early-Evolution-Feathers-2009.pdf



Figure 3. Feathers from French amber take place between the very distinct stages II and IIIa proposed in the developmental model of Prum (1999).

The evolution of the birds feathers well studied and understood

Perrichot, V., Marion, L.c., Néraudeau, D., Vullo, R., & Tafforeau, P. (2008) The early evolution of feathers: fossil evidence from Cretaceous amber of France. Proceedings of the Royal Society B: Biological Sciences, 275, 1639, pp 1197-1202 http://www.botanischergarten.ch/Evolution/ Perrichot-Early-Evolution-Feathers-2009.pdf Darwin's Finches: Taxonomy and Biology in many publications revealed into the details, one of Darwins great discoveries on the Galapagos Islands



Darwin, Finches from Galapagos, lithographs by Elisabeth and John Gould, Taxonomy by John Gould, collector: Charles Darwin, Galapagos Islands



Reiner, A. (2009)

Avian evolution: from Darwin's finches to a new way of thinking about avian forebrain organization and behavioural capabilities. Biology Letters, 5, 1, pp 122-124 <u>http://www.botanischergarten.ch/Evolution/Reiner-Darwin-Finches-new-2009.pdf</u>



one of Darwins major works: The Various Contrivances by whom **British and Foreing** Orchids are Fertilized by Insects

and on the good effects of Intercrossing 1862

ON THE VARIOUS CONTRIVANCES BY WHICH BRITISH AND FOREIGN ORCHIDS ARE FERTILISED BY INSECTS, AND ON THE GOOD EFFECTS OF INTERCROSSING. By CHARLES DARWIN, M.A., F.R.S., &c. LONDON: JOHN MURRAY, ALBEMARLE STREET. 1862.

) The Complete Work of Charles Darwin Online



ibine briter and an end

Coryanthes speciosa (nach Lindley's ,Vegetable Kingdom' copirt).

- L Labellum.
- B Eimer des Labellum.
- H Flüssigkeit absondernde Anhänge.
- P Ausguszmündung des Eimers, über den sich das, die Anthere und das Stigma tragende Ende des Säulchens wölbt.

# Coryanthes speciosus

Darwins print, copied from Lindley German translation







### Coryanthes

Corvanthes speciosa. Bestäuber



### www.weloennig.de/CorCat.html



Angraecum sesquipedale

Orchidaceae moth pollination predicted by Charles Darwin

Pollinator found later: Xanthopan morgani praedictus



Angraecum sesquipedale from Madagaskar

Orchidaceae moth pollination

Pollinator Xanthopan morgani praedictus

the pollinator predited by Charles Darwin



### http://www.criptozoo.com/absolutenm/templates/skin.asp?articleid=217&zoneid=1

#### http://darwin.gruts.com/weblog/archive/2008/02/

Charles Darwin famously <u>predicted the existence</u> of a species of Madagascan moth (since aptly named *Xanthopan morgani praedicta*), based on the shape of the nectaries of a species of orchid (*Angraecum sesquipedale*). Might it not be possible to take a leaf out of Darwin's book and make similar deductions retrospectively? Could parasitologists not study *tetrabothiids* and other modern parasites, and make deductions about their extinct ancestral hosts' lifestyles?



Interlude: the wonders of phenetics, one of the ultimate proofs of natural selection, but also a hint that Self-Organization might work in the background



phylogenetic and phenetic systems can be mixed in reality, selection produces similarities







Gazania Sunshine Hybrids, from South Africa



Actinodium cunninghamii, from Western Australia, with radiant tubular flowers, which look like normal sterile lateral flowers





Euphorbia fulgens, blazing red Euphorb from Africa, Euphorbiaceae, Nectaries transformed into petals for insect attraction



Euphorbia fulgens, blazing red Euphorb, Euphorbiaceae, Nectaries transformed into petals for insect attraction, the "anthers" are actually single male flowers


Carlina acaulis, Silberdistel, Asteraceae, the flower is produced by silvery scales



*Rhyothemis graphiptera* Queensland, Australia



Celithemis eponina Georgia, U. S. A.



#### Kolibri-Falter

















Euphorbia Africa left and Senita-Cactus (Cereus schottii) above





*Hoodia* sp. (Asclepiadaceae) in succulent karroo vegetation dominated by *Euphorbia dregeana* near Rosh Pinah, southern Namibia. September 2001



Astrophytum, Cactaceae

Euphorbia obesa, Euphorbiacecae







### Which is the Cactus, which the Euphorbia ??

Dogs and Humans... another kind of convergence...



Beyond Darwin: Examples from modern sciences supporting Darwin



**Figure 2.** Relationship between maximum bite-force performance and annual reproductive success in territorial male collared lizards. The number of offspring sired was in the range 1–10 offspring per male. Multiple regression analysis showed that only bite-force performance predicted reproductive success, whereas multivariate measures of body size and head shape did not. JERRY F. HUSAK, A.K.L., RONALD A. VAN DEN BUSSCHE, (2009)

The fitness advantage of a highperformance weapon.

Biological Journal of the Linnean Society, 96, 4, pp 840-845

http://www.botanische rgarten.ch/Evolution/ Husak-Fitness-Advantage-2009.pdf



**Figure 1.** Number of publications per year for various terms in PubMed from 1987 to 2007. Publications that include the terms, 'hybrid incompatibilites' and 'Haldane rule', are in the top half, while publications that include, 'genetics' and 'speciation' are in the lower half. Note the difference in scale between halves. Terms and words were searched in the title and abstract. Searches were case insensitive and the boolean logic operator, 'AND', was applied.

#### Kulathinal, R.J. & Singh, R.S. (2008)

The molecular basis of speciation: from patterns to processes, rules to mechanisms. Journal of Genetics, 87, 4, pp 327-338 <a href="http://www.botanischergarten.ch/Evolution/Kulathinal-Molecular-Speciation-2008.pdf">http://www.botanischergarten.ch/Evolution/Kulathinal-Molecular-Speciation-2008.pdf</a>



a) Experimental genotype (wild-type eye color).



b) Competitor genotype (claret eyes).



Two experimenta genotypes, wild type and claret eyes

b)

4 a)

3

Generation

several experimental environments and reactions of genotypes

**Fry, J.D. (2008)** Genotype-environment interaction for total fitness in Drosophila. Journal of Genetics, 87, 4, pp 355-362 <u>http://www.botanischergarten.ch/Evolution/Fry-Genotype-Environment-Drosophila-2008.pdf</u>



Fig. 9. Step response curves of plant 1 with different controllers.



Fig. 1. Flowchart of the SOGA.



Fig. 10. Step response curves of plant 2 with different controllers.

### Zhang, J.H., Zhuang, J., Du, H.F., & Wang, S.A. (2009)

Self-organizing genetic algorithm based tuning of PID controllers. Information Sciences, 179, 7, pp 1007-1018 http://www.botanischergarten.ch/Evol

ution/Zhang-Self-Organizing-Genetic-Algorithm-2009.pdf

2009: a new self-organizing genetic algorhytm



# Breakthrough for the development of better crops

The Zinc Finger Consortium continues to work to develop robust, publicly available methods for engineering zinc finger nucleases that function well in various cellular environments. The Consortium intends to make all methods, protocols, software, and reagents they develop available to the academic scientific community

http://www.zincfingers.org/scientific-background.htm





Mangelsdorf, P.C. (1986) The Origin of Corn. Scientific American, 255, 2, pp 80-86 <u>http://www.botanischergarten.ch/Bt/Mangelsdorf-Origin-Maize-1986.pdf</u>

Kimber, G. & Athwal, R.S. (1972) Reassessment of Course of Evolution of Wheat. Proceedings of the National Academy of Sciences of the United States of America, 69, 4, pp 912-& http://www.botanischergarten.ch/EPOBIO-Wheat/Kimber-Reassessment-Evolution-Wheat-1072.pdf

**Beyond Darwin** The case of Self-Organization, or Auto-Poiesis doubts that mutation is strictly built on random processes, Oľ is it a random process and finds other restrictions ?





isothermal

200°C

40min





### Ophrys lutea Orchidaceae

Mimikri for attracting male solitary bees for pseudo copulation





Erich Nelson: Ophyrys bertolonii, compact speculum: highly evolved



Eric Nelson: Ophrys holosericea with H-shaped speculum: ancestral

Beyond Darwin: Harmonics as a Science are harmonical structures strictly built on random mutation processes ? Hans Kayser Harmonia Plantarum

## HANS KAYSER HARMONIA PLANTARUM





#### Hans Kayser (1891-1964) 20th Century Pythagorean Master

The Science of Harmonics

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Fractal Harmonies

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- Harmonics in Nature

Harmonics & Music Theory

- Harmonic Theories & Diagrams
- Library & Resources
- Bookstore



Hans Kayser was one of the 20th century's leading scientists and made a profound philosophic study of harmonics.

Relatively unknown, but much respected, Hans Kayser wrote a series of works which deeply explored the fundamental principles of Pythagorean Harmony.

This website is dedicated to making Hans Kayser's work readily available, in conjuction with the recently founded Hans Kayser Translation Project.

#### The Hans Kayser Translation Project

There has been an urgent need for some time to make all of Hans Kayser's masterworks on Pythagorean Harmonics available to the English speaking world, since only one of Kayser's books (Akroasis) has been translated from the original German.

Recently a team of enthusiastic contributors has undertaken a project, through the Sacred Science Translation Society, to bring all of Kayser's books into English.



This project is well underway, with Kayser's magnum opus, "The Textbook of Harmonics," a massive 630 page technical presentation, which includes 500 of the most intriguing harmonic, geometric and mathematical diagrams ever created, now being complete and available to the general public.

Ariel Godwin

The quality of the translation for such a technical and scholarly work was a major consideration ..... Joscelyn Godwin more













Harmonic Proportion

## www.hanskayser.org, website from San Francisco, USA



### Leonardo da Vinci's Human Canon

Paestum, Southern Italy, Neptun Temple http://www.molgen.mpg.de/~spang/christina/ Archaic doric temple, contructed ca. 460 BC

Paestum, Neptun Temple

### Snow Flakes with harmonic structures

http://hanskayser.com/EZ/kayser2/kayser2/index.php

## Beyond Darwin: Harmonics as a Science the link between harmonics and fractals



#### Hans Kayser, harmonic analysis of plant bifurcations

TREE BRANCHES

CIRCULATORY

SYSTEM

LUNGS









http://www.bmeijer.com/software/fractal\_generator/index.html www.bioquest.org/esteem/esteem\_details.php?pr...



This fractal system was first explored by Michael Barnsley at the Georgia Institute of Technology in the 1980s


Aeonium tabuliforme, Teno mountains, Tenerife

Aeonium tabuliforme Tenerife double spiral



Fractal structure of cauliflower

www.inkycircus.com/jargon/2005/10/index.html

## Beyond Darwin: Evolutionary insights in small structures, Biomimetics as a new science



## the classic example of biomimetics

Lotos-Blüte



### submicroscopical fine structure causing the lotos-effect





### Lotos effect: dirt is taken up by the rolling water droplets





Extremes Wüstenmoos: Exormotheca, baut sich Gewächshäuschen

Photo K. Ammann

# Still function after 200 years, WHY??

Moss Peristome teeth regulate spore dispersal

late spore dispersal

Aoss Persistomes r

Ex







invitation to browse in the website of the Friends of Charles Darwin <a href="http://darwin.gruts.com/weblog/archive/2008/02/">http://darwin.gruts.com/weblog/archive/2008/02/</a>



Photograph of Charles Darwin by Maull and Polyblank for the Literary and Scientific Portrait Club (1855)



### **Dialogue between Evolutionists and Creationists**

The situation is much more complex in the debate: whyle we can dismiss a politically or fundamentally base of creationism, evolutionism has to evolve by itself on the basis of sustainability





# Features

# Integrated farming: why organic farmers should use transgenic crops

awkward production system, are seriously biased with a supposedly 'democratic' participation of hundreds of authors with no real independent peer review. This contrasts with the case of the UN global warming reports, which gives solid facts on global warming but remains highly controversial when proposing remedies

Klaus Ammann, klaus.ammann@ips.unibe.ch

# Sustainable World



#### Agriculture

Foster renewable natural resources, knowledge based agriculture: Eco-Precision-Biotech Ag, Balance local production with global trade

#### Socio-Economics

Equity: reconcile traditional knowledge with science, foster biomimetics, reduce agricultural subsidies, global dialogue including new creative capitalism

#### Technologies

Innovation supported by artificial intelligence, influence evolution, new technologies to process and use of housing, food, energy Message from my wife, Dr. Biljana Papazov Ammann Bulgarian Philosopher

• 1. One should not receive Darwin roughly as the one who has emancipated nature from the divine principle and just having left it to chance.

 2. Darwin was not the one, who, influenced by the emergence of the industrial society, understood and postulated the process of natural selection solely on competition with deadly endings.

These two simplifications can become dangerous and cause calamities. Today we need, rather than competition more collaboration.

3. It is Theories which coin our relationship to the world, because they contain not only facts but also hidden interpretations. Therefore it is important to realize more consciously how we are building theories:

The mechanism is the following: there is no cognition without self-recognition, and vice versa no self-recognition without cognition.

### **Evolution and Involution**

Without interaction between recognizing the visible world of beauty and diversity in nature and listening to invisible things full of love in our hearts, nothing will work.

4. We are not only mere scientific observers, and not only blind passengers, but we have to move towards the development and *shaping of live*. We owe that to our children

Rudolf Steiner:

"Evolution is the expansion of the Spirit in the material world, involution is the concentration of the Spirit in the inner realms of the soul."



Photograph of Charles Darwin by Maull and Polyblank for the Literary and Scientific Portrait Club (1855)

# arwin iDea **BIG EXHIBITION**

invitation to browse in the website of the Friends of Charles Darwin <a href="http://darwin.gruts.com/weblog/archive/2008/02/">http://darwin.gruts.com/weblog/archive/2008/02/</a>